

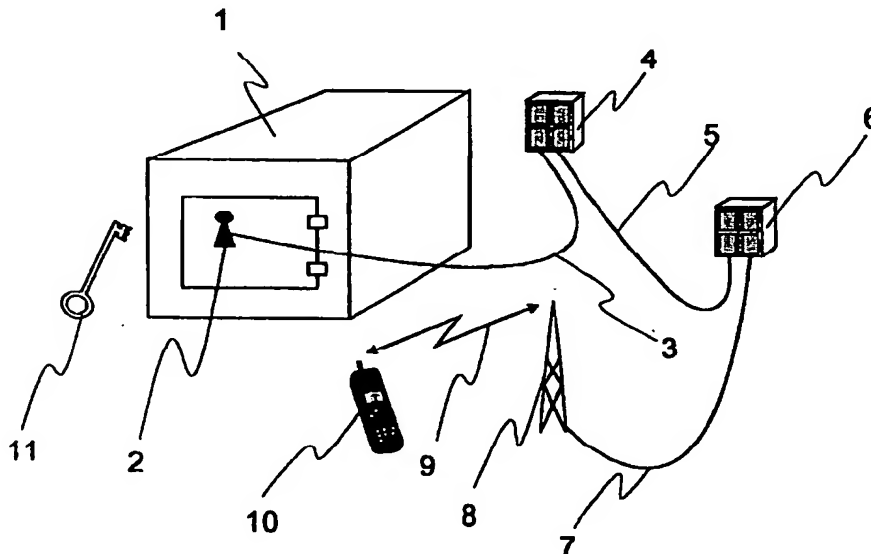
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International BureauAPR 2005
P000915
DA

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : H04M 11/00		A1	(11) International Publication Number: WO 00/69157
			(43) International Publication Date: 16 November 2000 (16.11.00)
(21) International Application Number: PCT/FI00/00040		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 21 January 2000 (21.01.00)			
(30) Priority Data: 991081 11 May 1999 (11.05.99) FI			
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		Published With international search report. In English translation (filed in Finnish).	

(54) Title: REMOTE CONTROL SYSTEM FOR A SAFE



(57) Abstract

The invention pertains to a method and arrangement for implementing the operation and billing of safety storage boxes (1). According to the invention, a terminal (10) of a cellular telephone system accepted for the safety storage box (1) in question is utilized in the opening and billing of safety storage boxes (1).

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Remote control system for a safe

The invention relates to a method of operation for safety storage boxes in which method in order to open the locks of a safety storage box and to use the safety storage box a call is placed on a terminal of a cellular network to a telephone number assigned in a public telephone network to the safety storage box in question. The invention also relates to a safety storage system comprising a space for a safety storage box, a safety storage box, a locking mechanism for the safety storage box, a control system and a means for connecting the system to a public telephone network. Additionally the invention relates to a control and monitoring arrangement for a safety storage box, comprising a safety storage box, a locking mechanism for the safety storage box, which locking mechanism is connected to the control system of the safety storage box, a connection from the control system to a public telephone network, and a terminal of a cellular telecommunication network for placing a call to said telephone number.

In commerce, cash or other means of payment comparable to cash are still widely used. Transportation of cash or similar valuables from a business to another or to a bank is sometimes hazardous. Despite the fact that money/goods deliveries are protected in one way or another, robberies are committed. The longer the distance transported and the more inconvenient the hour, the greater the need to get the money to a temporary safe place of storage from which a money service partner can pick it up. Traditionally it has been the banks' job to count and store the money and transfer it to the appropriate accounts. This has been based on money service agreements between the banks and customers. However, banks have dramatically cut down their branch offices and are trying to get rid of the work involved with the handling of large amounts of cash. Therefore, various safe-type intermediate storages, night deposit boxes and safety deposit boxes, which are hereinafter generically called safety storage boxes, are increasingly used for the temporary storage of money used in businesses. Money service customers take their cash into these safety storage boxes e.g. after they have closed their businesses for the day. The company that maintains the safety storage boxes invoices the customers as agreed. As banks tend to cut down their share of the work involved with the counting, storage and transportation of money or similar valuables, specialized firms have begun to handle these tasks. They sign money service agreements with customers, which agreements may cover part or all of the above-mentioned money handling tasks previously carried out by banks.

As such, the use of safety storage boxes is quite convenient, but it is difficult to separate in the customer's bill the portion charged for the use of the safety storage box from the sum charged for other work under the money service agreement. It is obvious that the customer would like to pay only for the actual use of the safety storage box, not for potential use. It is impossible with the current methods to introduce billing based on actual use without considerable additional costs. Indeed, the standard procedure is to agree in advance on the costs of use of safety storage boxes per time period (usually a month). If the billing is to be based on actual use, it requires a lot of manual labor to calculate the customer's usage and to make the billing correct.

In addition, the operational security of safety storage boxes is based on a single key or some other similar arrangement. If the key falls into wrong hands, it is possible the money/goods in the safety storage box may at least be spoilt. Should one want to make possible the use of a safety storage box only at certain times of day, one would have to add a separate timing apparatus to the locking mechanism of the safety storage box so that the operating hours of the safety storage box could be controlled as desired. The addition of such a timing apparatus increases the manufacturing costs of the safety storage box. Moreover, the operation of the timing apparatus cannot be 100%-guaranteed, which means a big risk to the customer.

The object of the invention is to eliminate said disadvantages associated with the prior art.

The method according to the invention for using safety storage boxes, in which method in order to open the locks of a safety storage box and to use the safety storage box a call is placed on a terminal of a cellular network to a telephone number assigned in a public telephone network to the safety storage box in question, is characterized in that said telephone number is a service number and that the usage of the safety storage box is billed on the basis of the number of uses of the service number.

The safety storage system according to the invention is characterized in that the safety storage system comprises a means for connecting a control system to a service number in a public telephone network and a means for billing the customer for the use of the safety storage box on the basis of the number of uses of the service number.

The safety storage box control and monitoring arrangement according to the invention is characterized in that the telephone number in the public telephone network, which number is part of the arrangement, is a service number and that a means has been attached to the service number for counting the calls coming to it from a given
5 terminal of a cellular network and billing the customer on the basis of the number of calls placed to said telephone number.

Advantageous embodiments of the invention are specified in the dependent claims.

The basic idea of the invention is as follows: The control and cost monitoring of a safety storage box utilize in addition to current, conventional lock-and-key solutions
10 also cellular phones used in cellular networks. When a customer wants to use the safety storage box, he calls on his mobile phone to the telephone number of the safety storage box in question, said telephone number advantageously being a so-called service number. A given safety storage box may advantageously have several different service numbers to facilitate differently priced services. Similarly, each
15 customer may be assigned a special service number of his own. In an embodiment of the invention an arrangement associated with the service number authenticates the phone's identity/phone number and if the control system recognizes that the identity/phone number is accepted by the system, the electric safety lock in the safety storage box is opened, enabling the mechanical lock in the safety storage box
20 to be opened with a key. If the control system does not identify the cellular phone number as an accepted number, the electric safety lock will not be opened and, hence, the mechanical lock cannot be opened with the key or the like. The network operator invoices the user of the safety storage box according to the service calls made or on the basis of the number of uses of the safety storage box with a service
25 call bill attached to the normal telephone bill. In another embodiment of the invention the calling number is not authenticated but the safety storage box can be opened with a key or a corresponding arrangement always after a call. In an embodiment of the invention a plurality of safety storage boxes are installed in one and the same locked-up room. Opening of the door of the room is carried out in the
30 same way as the opening of the safety storage box proper.

An advantage of the invention is that it improves the operational security of safety storage boxes.

Another advantage of the invention is that the improvement of the security of a safety storage box is technically easy to realize using cellular telephone technology.

A further advantage of the invention is that customers can be invoiced according to actual use, which is both advantageous and preferable from the customers' point of view.

5 A yet further advantage of the invention is that no extra billing systems are needed to realize the billing on a per-use basis, but the usage-based billing for the use of a safety storage box can be handled by the network operator in conjunction with the normal telephone bill.

10 A still further advantage of the invention is that one and the same safety storage box can be shared by different banking syndicates because each user can be billed according to actual use.

The invention will now be described in detail. Reference will be made to the attached drawings wherein

Fig. 1 shows a safety storage box realized using the method according to the invention and associated peripheral arrangements and devices,

15 Fig. 2a shows in the form of flow diagram a functional procedure for a safety storage box according to the invention,

Fig. 2b shows in the form of flow diagram a second functional procedure for a safety storage box according to the invention,

20 Fig. 3 shows in the form of flow diagram a third functional procedure for a safety storage box according to the invention,

Fig. 4 shows in the form of flow diagram a fourth functional procedure for a safety storage box according to the invention, and

Fig. 5 shows one possible way of logging the use of a safety storage box and charging for its use.

25 Fig. 1 shows a safety storage box arrangement according to the invention. It comprises the safety storage box 1 proper, a mechanical/electric locking mechanism 2 in the safety storage box, a mechanical opening mechanism 11 for the locking mechanism 2, said opening mechanism being advantageously a key, code lock, smart card, keycard or the like, a control system 4 for the electric locking mechanism 2, a connection 3 between the control system 4 and the electric locking mechanism 2, which
30 connection may be implemented with a fixed cable or radio link, a connection 5

from the control system 4 to a telephone system 6, which connection 5 may be either a fixed cable link or a radio link, a connection 7 from the telephone network 6 to a cellular telephone network 8, and a radio link 9 between a base station of the cellular network and a terminal 10 of the cellular network, which terminal advantageously is a cellular phone. There may be a plurality of safety storage boxes according to Fig. 1 in one and the same lockable room. In that case, each customer may be given a separate safety storage space in that room according to his needs.

The safety storage box 1 is used mainly as follows. A customer intending to use the safety storage box 1 places via a cellular network 8 a call on his terminal 10, which may be a cellular phone or a satellite phone, to a phone number in a telephone network 6 maintained by a network operator, which phone number advantageously is a service number. The service number may advantageously be operating mode specific or user specific. The service number may also be the same for all operating modes and users. If the calling terminal 10 fulfils certain predefined conditions, the telephone network 6 sets up a connection 5 to the control system 4 of the safety storage box 1. The control system 4 opens the electric safety lock in the locking mechanism 2 so that the customer can use the conventional opening mechanism 11 to open the safety storage box 1.

In an advantageous embodiment of the invention the calling terminal 10 is connected like an ordinary call via a telephone network 6 to the control system 4 of the safety storage box 1, and it is the control system 4 that authenticates the calling terminal 10.

In an advantageous embodiment of the invention the calling terminal 10 is connected like an ordinary call via a telephone network 6 to the control system 4 of the safety storage box without authentication.

In an advantageous embodiment of the invention no opening mechanism 11 is needed to open the locking mechanism 2 of the safety storage box 1, but the safety storage box 1 is opened after the wholly electrical user authentication.

In an advantageous embodiment of the invention the control system 4 of the safety storage box 1 allows a particular user to use the safety storage box 1 only during certain predetermined hours.

In an advantageous embodiment of the invention the methods and equipment described above are also used in order to gain access to the room in which the safety storage box or boxes is/are located.

Billing for the use of a safety storage box 1 according to Fig. 1 is carried out by the network operator maintaining the telephone number, advantageously a service number. Calls from each accepted phone number to the service number assigned to the safety storage box 1 and advantageously reserved to a certain service or customer are logged by the network operator, and accepted calls/safety storage box usage are billed according to an agreement in conjunction with normal telephone bills or possibly, if so agreed, the billing is realized using a separate invoice sent by the network operator.

Fig. 2a shows as an example in the form of flow diagram an embodiment of the invention for using a safety storage box 1. The use of the safety storage box starts at step 20a in which the user of the safety storage box calls the safety storage box's telephone number, advantageously a service number, maintained by a network operator. The service number may advantageously be operating mode specific or user specific. The service number may also be the same for all operating modes and users. In step 21a a telephone connection is established between the terminal 10 and the control system 4 of the safety storage box 1. In step 22a the control system 4 authenticates the phone number of the calling terminal. If the phone number of the calling terminal 10 is not on the list of accepted phone numbers in the memory of the control system 4, the control system 4 will not allow further action but the telephone connection is terminated and operation ends at step 29a. If the control system 4 verifies that the calling terminal 10 is on the list of accepted phone numbers, the control system 4 opens in step 23a the electric safety lock 2 in the safety storage box 1. After that, in step 24a, the opening mechanism 11 is used to open the mechanical lock of the safety storage box 1. In step 25a the goods, such as money, data disk or valuables, are placed in the safety storage box 1. In step 26a the mechanical lock of the safety storage box 1 is closed. In step 27a the telephone connection between the terminal 10 and the control system 4 is terminated by either the terminal 10 or the control system 4. In step 28a the control system 4 of the safety storage box 1 turns on the electric safety lock 2 of the safety storage box 1. In step 29a the use of the safety storage box 1 ends.

Fig. 2b shows as an example in the form of flow diagram a second advantageous embodiment of the invention in which the arrangement according to the invention does not require that the calling telephone number be authenticated. The use of the safety storage box starts at step 20b in which the user of the safety storage box 1 calls the safety storage box's telephone number, advantageously a service number, maintained by a network operator. The service number may advantageously be

7.

operating mode specific or user specific. The service number may also be the same for all operating modes and users. In step 21b a telephone connection is established between the terminal 10 and the control system 4 of the safety storage box 1. In this embodiment the calling number is not authenticated but in step 23b the electric safety lock of the safety storage box 1 is opened and the user of the safety storage box 1 can carry out actions as desired. From here on the operation in steps 24b to 29b is identical to that of the embodiment discussed in connection with the description of Fig. 2a.

Fig. 3 shows as an example in the form of flow diagram another embodiment of the invention for using a safety storage box 1. The use of the safety storage box 1 starts at step 30 by placing a call to the safety storage box's telephone number, advantageously a service number, maintained by a network operator. The service number may advantageously be operating mode specific or user specific. The service number may also be the same for all operating modes and users. In step 31 a telephone connection is established between the terminal 10 and the control system 4 of the safety storage box 1. In step 32 the control system 4 authenticates the phone number of the calling terminal 10. If the phone number of the calling terminal 10 is not on the list of accepted phone numbers in the memory of the control system 4, the control system 4 will not allow further action but the telephone connection is terminated and operation ends at step 39. If the control system 4 verifies that the calling terminal 10 is on the list of accepted phone numbers, the control system 4 opens in step 33 the electric safety lock 2 in the safety storage box 1 and keeps it opened for a predetermined period of time. In step 34 the connection between the terminal 10 and the control system 4 of the safety storage box 1 is terminated. In step 35 the mechanical lock 2 of the safety storage box 1 is opened using an opening mechanism 11. In step 36 the goods are placed in the safety storage box 1. In step 37 the mechanical locking mechanism 2 of the safety storage box 1 is closed. The electric safety lock 2 in the safety storage box 1 is turned on in step 38 and the use of the safety storage box 1 ends at step 39.

There is a variation of the embodiment shown in Fig. 3 in which the telephone number of the calling phone is not authenticated. In such an embodiment the operation goes direct from step 31 to step 33 from which point on the operation continues as described above until step 39.

Fig. 4 shows as an example a third embodiment according to the invention. The embodiment according to Fig. 4 includes in addition to a telephone number authentication 42a also a user authentication 42b which is realized by requesting a special

code. In this embodiment, too, the operation starts with a call to a telephone number, advantageously an operating mode or user specific service number, maintained by a network operator, step 40, whereby a telephone connection is established between the terminal 10 and the control system 4 of the safety storage box 1, step 41. In step 42a the number of the calling phone is authenticated. If the number is not included in the set of accepted phone numbers, the call is rejected and operation ends at step 49. If the number is included in the set of accepted phone numbers, step 42b, the customer-specific code is checked. If the user does not give the correct code, the process moves on to step 49 in which the operation is ended. If in step 42b the user of the terminal 10 gives the correct code, operation continues in accordance with the embodiment illustrated in Fig. 2a, 2b or 3, steps 43 to 48. This embodiment enables a wholly electric operation of the safety storage box 1.

The agreement on money services defines the method of billing for the use of safety storage boxes. The cost monitoring and billing for the use of a safety storage box are arranged according to the invention as shown in Fig. 5. In step 50 the user of the safety storage box 1 calls the safety storage box's telephone number, advantageously a service number. The service number may advantageously be operating mode specific or user specific. The service number may also be the same for all operating modes and users. In step 51 a telephone connection is established between the terminal 10 of the customer using the safety storage box 1 and the control system 4 of the safety storage box 1. In step 52 the number of the calling terminal 10 is authenticated. If the number is not accepted, the connection is terminated and the process moves on to step 55, whereby no service to be billed is carried out. If the phone number of the terminal 10 is on the list of accepted phone numbers, the connection is allowed and the usage is logged normally by the network operator. In step 54 the customer is billed in conjunction with the normal telephone bill for the actual usage of the safety storage box 1. The billing is handled by the network operator maintaining the telephone number in question. The cost resulting from one use is advantageously different for different operating modes and different users. The billing is followed by step 55 in which the customer has been billed on a per-use basis.

Above it was described some embodiments of the invention. The invention is not limited to the solutions described above. For example, the usage and billing for safety deposit boxes in banks or other premises can be implemented using the above-described methods and hardware arrangements. In that case, the above-described methods and equipment can be used to gain access to the room in which

the safety deposit boxes are located. In addition, the invention idea can be applied in many ways without departing from the scope of the claims attached hereto.

Claims

1. A method for the use of safety storage boxes (1), in which method in order to open the locks (2) of a safety storage box (1) and to use the safety storage box (1) a call (20a, 20b, 30, 40, 50) is placed on a terminal (10) of a cellular network to a telephone number assigned in a public telephone network to the safety storage box (1) in question, **characterized** in that said telephone number is a service number and the billing (53, 54) for the use of the safety storage box (1) is based on the number of uses of the service number.
2. A method according to claim 1 for the use of safety storage boxes (1), **characterized** in that each customer calls to a service number of his own.
3. A method according to claim 1 for the use of safety storage boxes (1), **characterized** in that the use of the service of a given safety storage box requires that a call be made to a certain service number.
4. A method according to claim 1 for the use of safety storage boxes (1), **characterized** in that the mechanical locking system (2) of the safety storage box (1) remains open (23, 28) for the duration (21-28) of the service call.
5. A method according to claim 1 for the use of safety storage boxes (1), **characterized** in that the mechanical locking system (2) of the safety storage box (1) remains open for a predetermined time (33-38) after the service call has been connected.
6. A method according to claim 1 for the use of safety storage boxes (1), **characterized** in that in order to open the safety storage box (1) the telephone number of the calling terminal is authenticated (22a, 32, 42a).
7. A method according to claim 5 for the use of safety storage boxes, **characterized** in that in order to open the safety storage box (1) a user code is checked (42b) and after successful checking the mechanical locking system (2) of the safety storage box (1) is opened.
8. A safety storage system comprising an at least partly closed space for a safety storage box, at least one safety storage box (1), a locking mechanism (2) in the safety storage box, a control system (4) and a means for connecting the system to a public telephone network (5), **characterized** in said safety storage system additionally comprises a means (5) for connecting the control system (4) to a service num-

ber in a public telephone network (6) and a means for billing (53, 54) the customer for the use of the safety storage box (1) on the basis of the number of uses of the service number.

9. A safety storage system according to claim 8, **characterized** in that the safety
5 storage box is placed in a closed space the door of which is arranged so as to be opened by placing a call to a service number assigned to the door.

10. A safety storage system according to claim 8, **characterized** in that it comprises
- a means for comparing the caller's number to at least one stored telephone number
10 (4),
- a means for authenticating at least one telephone number (4), and
- a means for authenticating the caller of the incoming call (4).

11. A safety storage system according to claim 10, **characterized** in that said
safety storage system is arranged so as to receive a code from the caller and to com-
15 pare it to allowed codes (42b).

12. A safety storage system according to claim 8, **characterized** in that the service number is particular to each user.

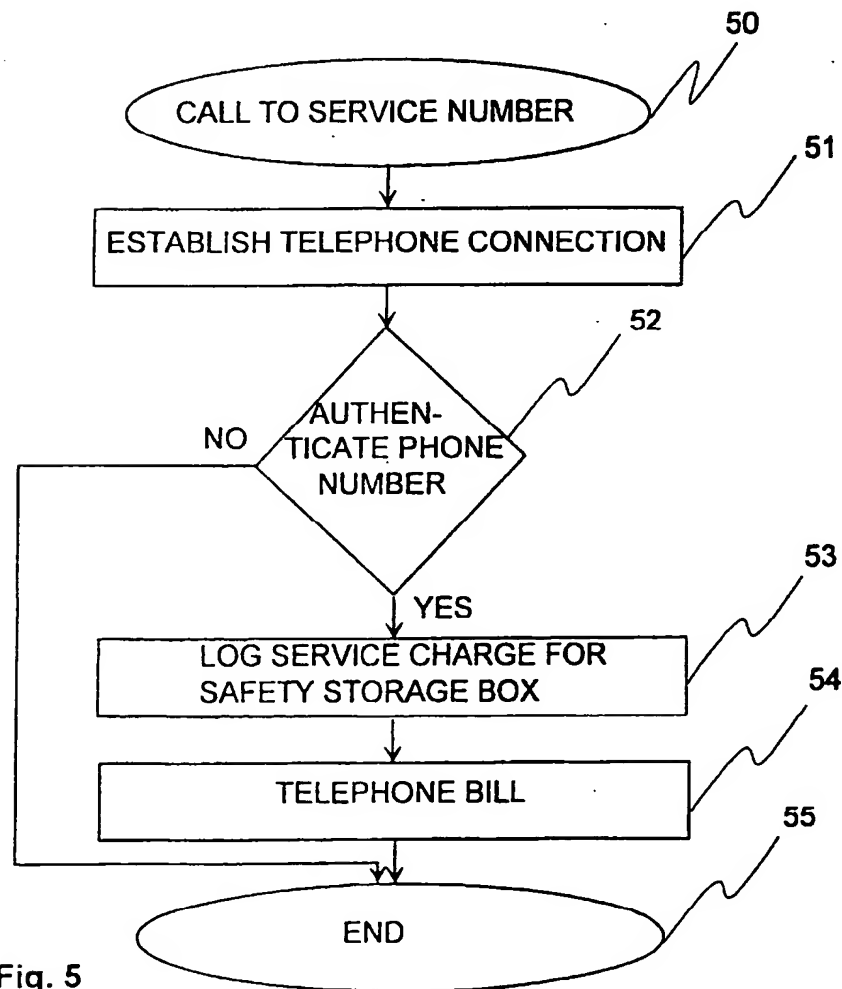
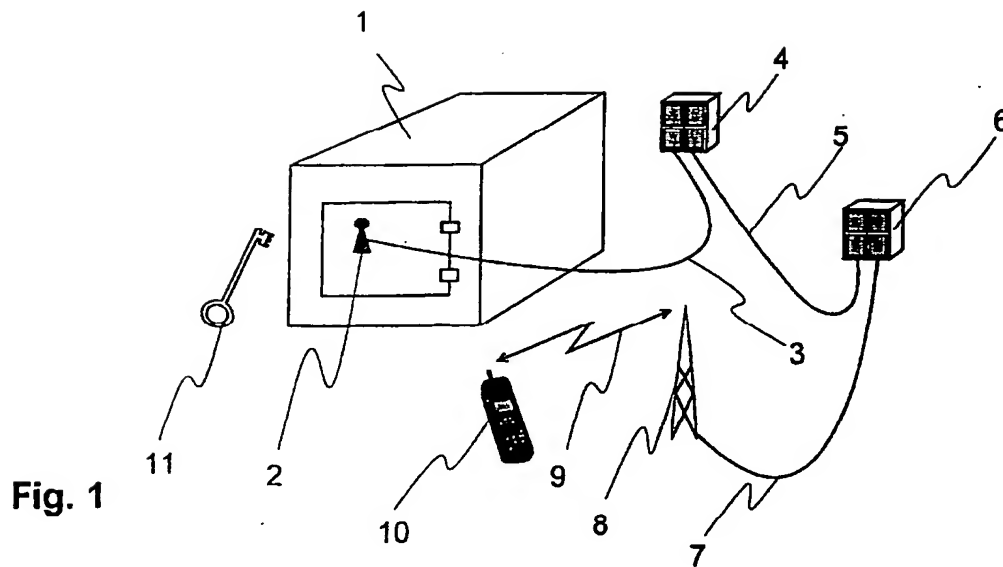
13. A safety storage system according to claim 8, **characterized** in that the service number is particular to each safety storage service.

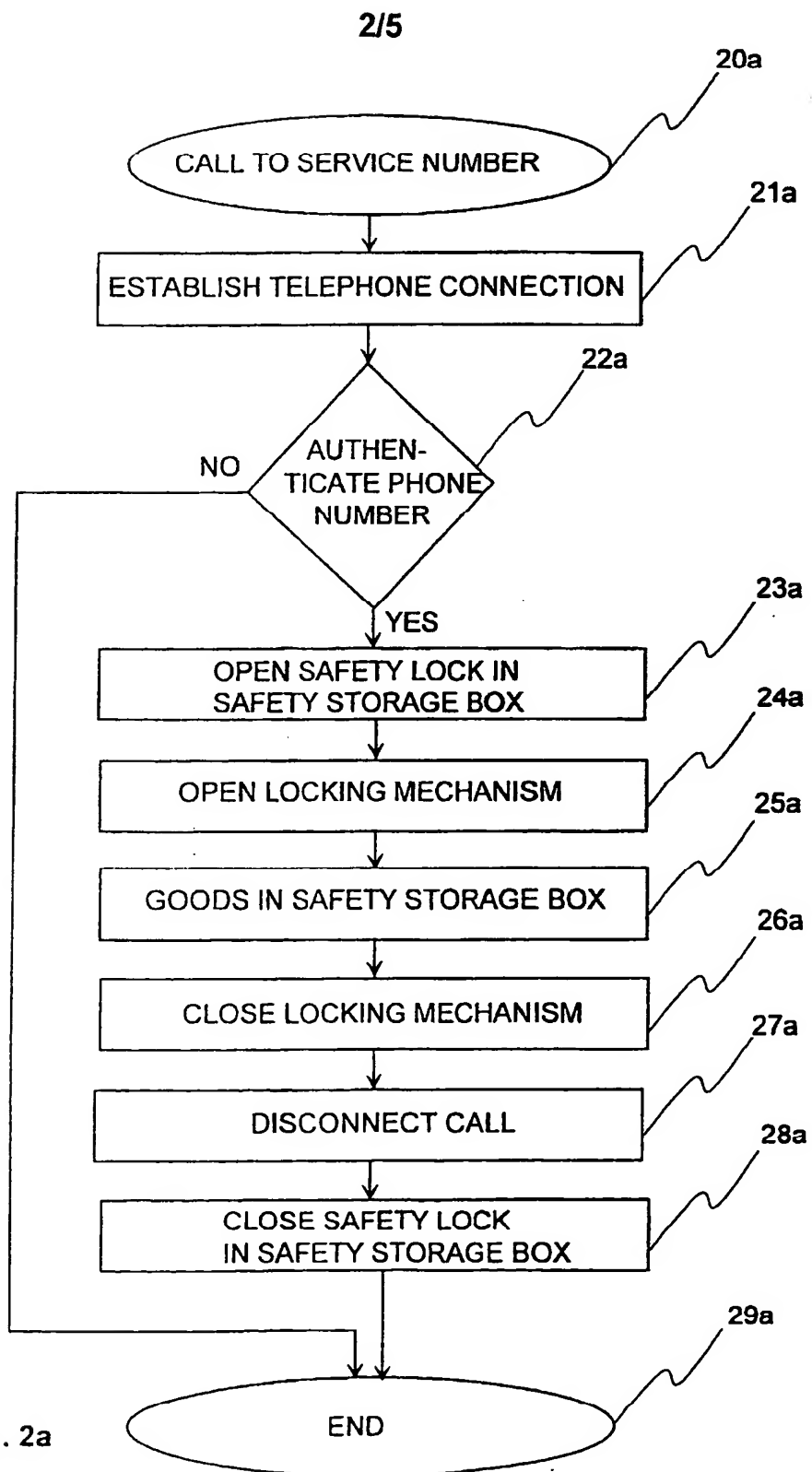
20 14. A safety storage box control and monitoring arrangement comprising a safety storage box (1), a locking mechanism (2) in the safety storage box, which locking mechanism is connected (3) to the control system (4) of the safety storage box (1), a connection (5) from the control system (4) to a public telephone network and, within the telephone network, to a known telephone number, and a terminal (10) of
25 a cellular network for establishing a connection to said telephone number, **characterized** in that the telephone number in the public telephone network (6) is a service number and that a means has been attached to the service number for counting the calls coming to it from a given terminal (10) of a cellular network and billing the customer on the basis of the number of calls placed to said telephone number.

30 15. A control and monitoring arrangement according to claim 14, **characterized** in that the service number is particular to each user.

16. A control and monitoring arrangement according to claim 14, **characterized** in that the terminal (10) is a cellular phone.
17. A control and monitoring arrangement according to claim 14, **characterized** in that the terminal (10) is a satellite phone.
- 5 18. A control and monitoring arrangement according to claim 14, **characterized** in that the connection (5) from the control system (4) of the safety storage box (1) to the public telephone network (6) is realized by means of a radio link.
- 10 19. The use of the safety storage system or its control and monitoring arrangement according to any one of claims 8 to 18 in the storage of money, valuables or other valuable items.

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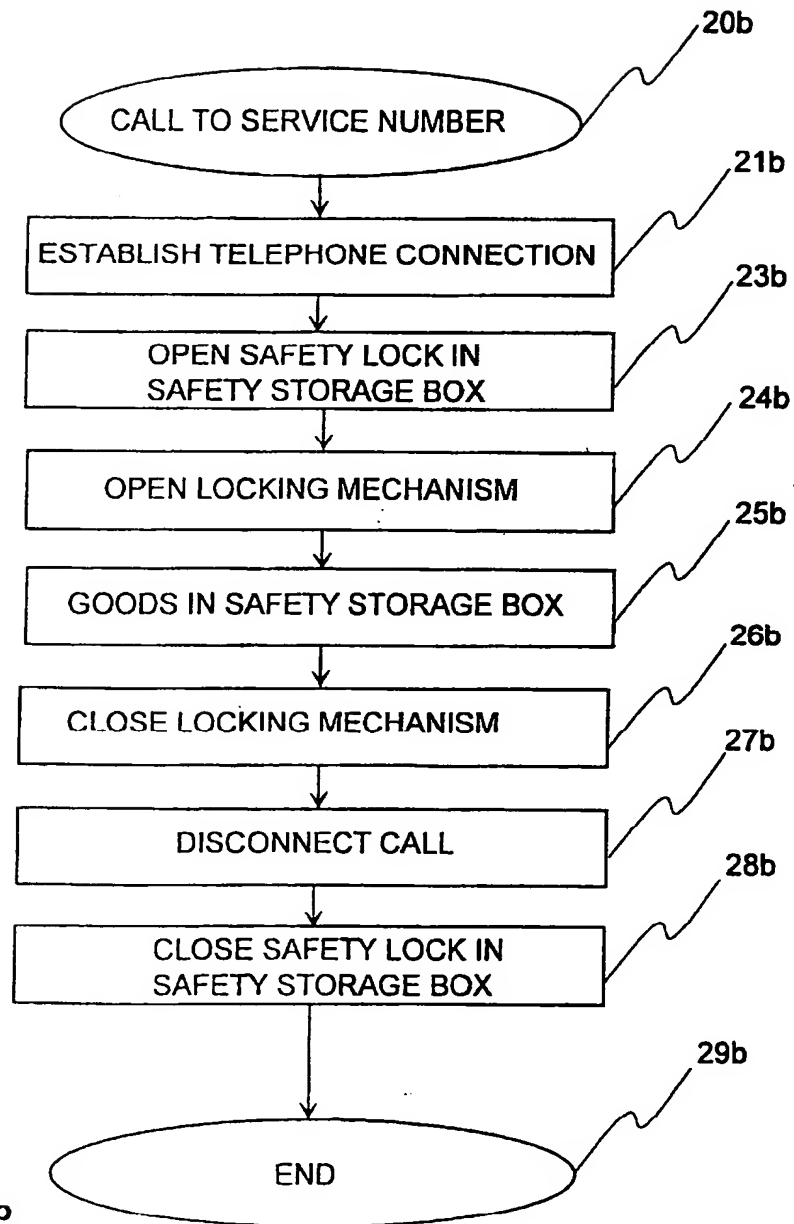


Fig. 2b

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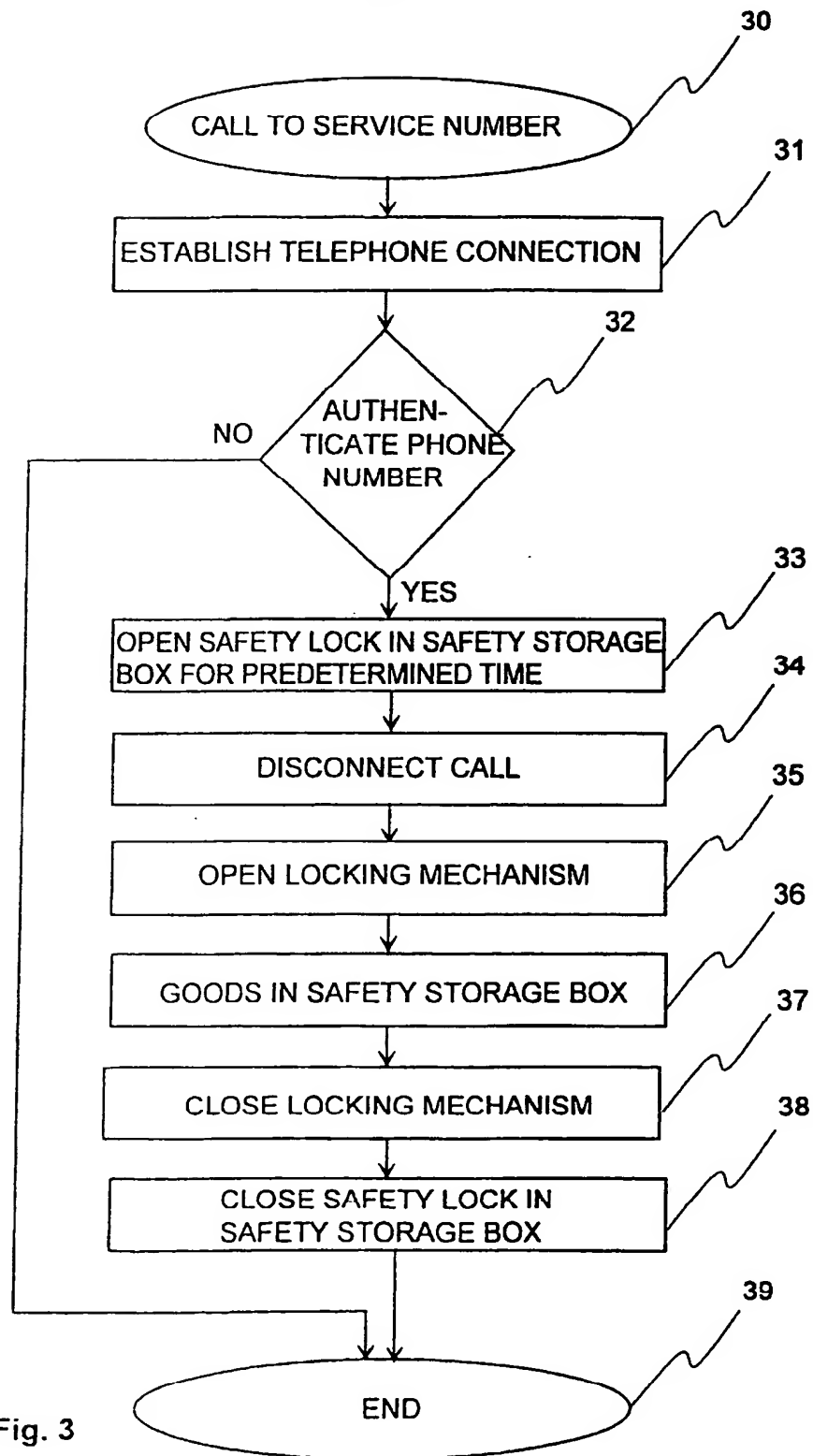


Fig. 3

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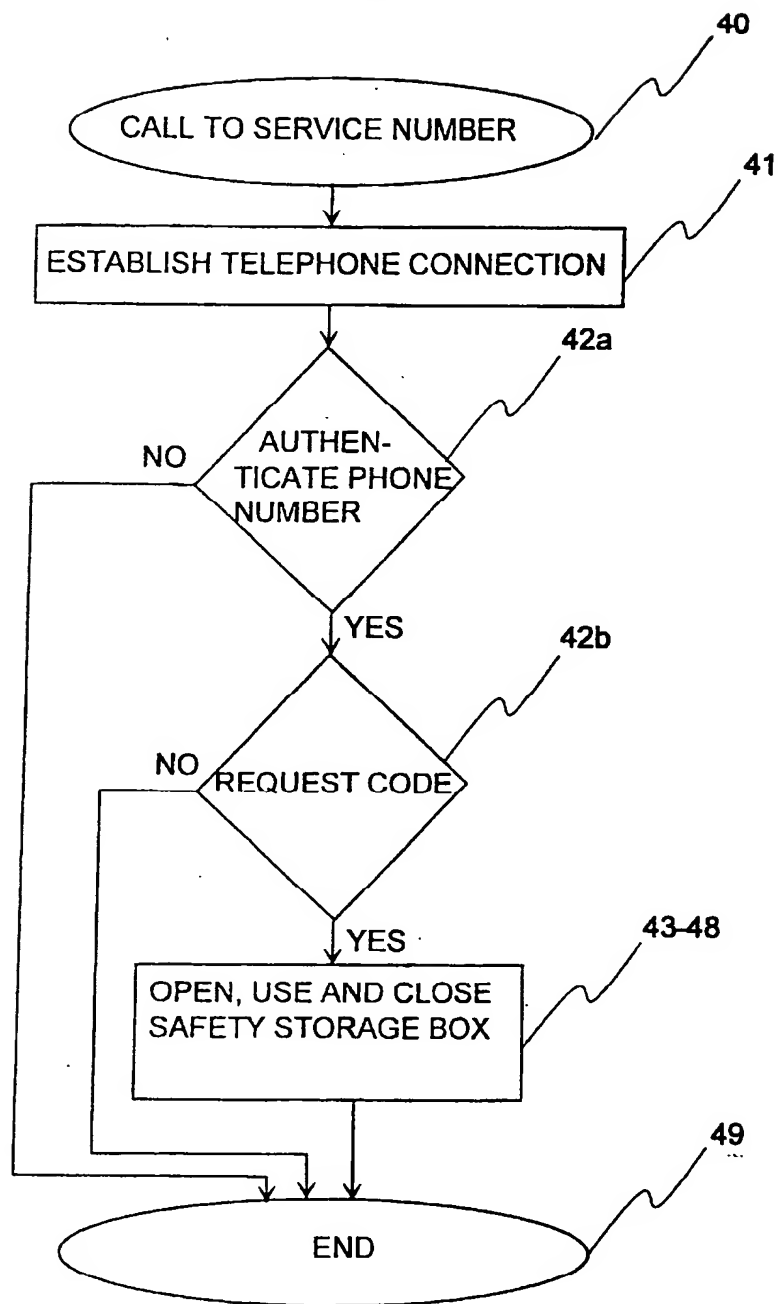


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 00/00040

A. CLASSIFICATION OF SUBJECT MATTER		
IPC7: H04M 11/00 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC7: E05B, H04B, H04M, H04Q		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5705991 A (JOHN M. KNIFFIN ET AL), 6 January 1998 (06.01.98), column 2, line 28 - column 11, line 45, figures 1-4, abstract --	1-19
Y	US 4616111 A (TULIO VASQUEZ), 7 October 1986 (07.10.86), column 1, line 5 - column 3, line 54, figures 1-3, abstract --	1-19
Y	Patent Abstracts of Japan, abstract of JP 6-133068 A (SANYO ELECTRIC CO LTD KANSAI MEDICAL SER), 13 May 1994 (13.05.94) --	1-19
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
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29 May 2000		07-06-2000
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 00/00040

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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